Dec. 18, 1928.

1,695,406

F. J. YOUNG

CASING SWAB

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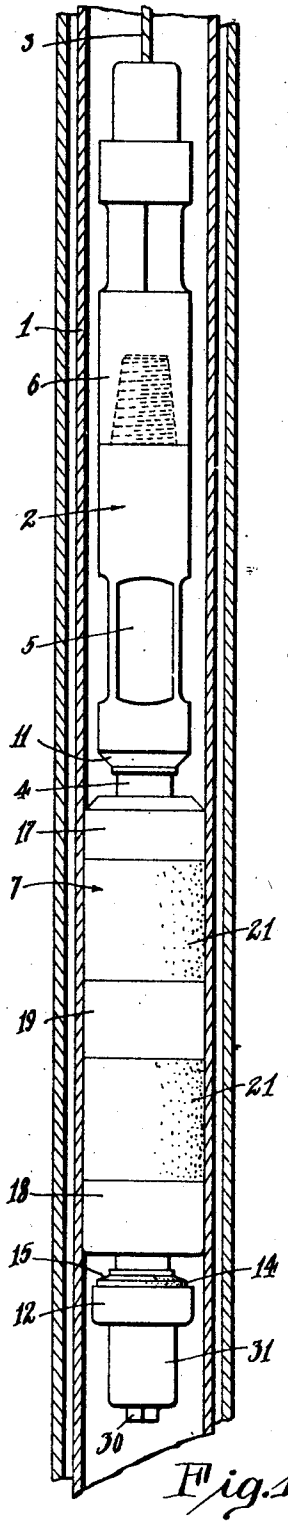


Fig. 1.

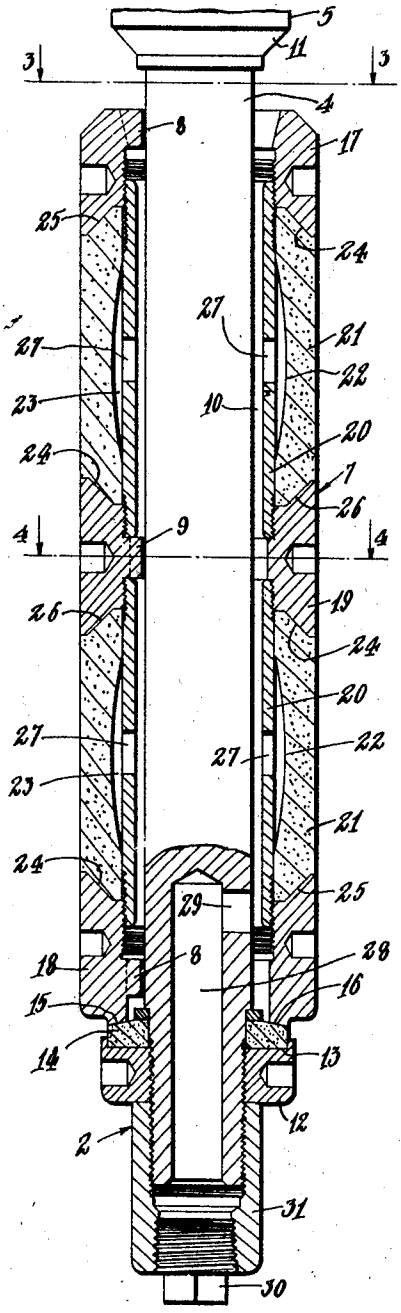


Fig. 2.

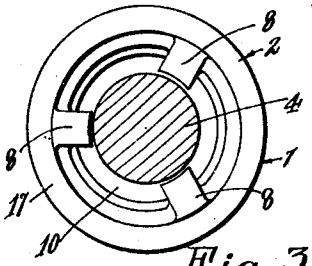


Fig. 3.

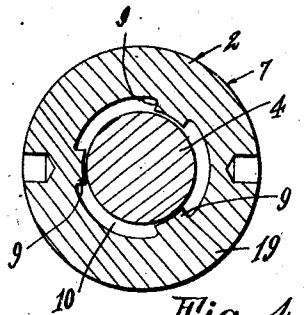


Fig. 4.

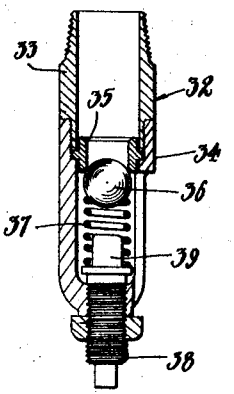


Fig. 5.

Inventor

Forrest J. Young.

By Lyon & Lyon Attorneys

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UNITED STATES PATENT OFFICE.

FORREST J. YOUNG, OF TORRANCE, CALIFORNIA, ASSIGNOR TO THE NATIONAL SUPPLY COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

CASING SWAB.

Application filed February 17, 1926. Serial No. 88,842.

This invention relates to casing swabs, and more particularly to a swab for use in casings of oil wells and the like for either cleaning the well or for the purpose of raising the oil to the surface of the well.

An object of this invention is to provide a casing swab having packers or packing sleeves which may be adjusted to the diameter of the casing before the same is positioned in the casing, and which packers are so mounted as to take a friction hold on the walls of the casing sufficient only to slightly retard the downward movement of the swab in the casing and through which swab, due to the friction hold, an open passage is maintained on the lower end of the same in the casing, and which passage is closed by the movement of the swab upward in the casing, due to the friction hold between the packers and the walls of the casing.

Another object of this invention is to provide a swab having a mandrel which is adapted to be secured to a cable or line and upon which mandrel a mandrel sleeve is mounted so as to be longitudinally slidable, and which sleeve is held spaced from the said mandrel so as to provide a fluid passage between the mandrel and the sleeve, and upon which mandrel a sleeve is formed at its lower end to engage the end face of the said sleeve on upward movement of the swab to close the passage provided between the mandrel and the sleeve.

Another object of this invention is to provide a swab which comprises a rigid mandrel upon which a tubular sleeve is longitudinally and slidably mounted, and upon which sleeve packing cylinders outwardly concaved on their inward periphery are mounted, and through the interior of which sleeve oil is permitted to flow on the lowering of the said mandrel into the concave recesses formed by the outwardly concave packing cylinders so as to hold the packing cylinders by hydraulic pressure against the walls of the casing during the raising of the swab in the casing.

Another object of this invention is to provide a casing swab having the above enumerated characteristics which is of inexpensive construction and simple design and which is positive in operation and has a minimum of wearing parts.

Another object of this invention is to provide a casing swab which is adapted to be lowered and raised in the casing of an oil well and which oil well swab is adapted to be connected to an unloader device so regulated as to permit only a definite load of oil to be carried from the well so as to insure a definite maximum tension being placed upon the cable or line through the medium of which the said swab is operated.

Other objects and advantages of this invention will be apparent from the following detailed description of a preferred embodiment thereof as illustrated in the accompanying drawings, in which drawings:

Figure 1 is a side elevation of an oil well swab embodying this invention, illustrating the same as in position within an oil well casing and illustrating the tubular sleeve of the said swab in the position occupied during the lowering of the said swab in the casing.

Figure 2 is a side elevation mainly in vertical mid-section of a swab embodying this invention.

Figure 3 is a top plan view taken substantially on the line 3—3 of Figure 2.

Figure 4 is a top plan view taken substantially on the line 4—4 of Figure 2.

Figure 5 is a center sectional side elevation of an unloader device embodied in this invention.

In the preferred embodiment of this invention illustrated in the accompanying drawings, 1 illustrates a casing of an oil or like well into which the swab 2 is lowered on a cable 3 either for cleaning the well or for the purpose of raising or pumping the oil from the well.

The swab 2 comprises a mandrel 4 having a tool-joint 5 formed at its upper end, which tool-joint 5 is adapted to be connected with a socket 6 to which the cable 3 is secured in any desired or preferred manner.

Mounted on the mandrel 4 is a sleeve 7 which sleeve 7 is maintained spaced from the mandrel 4 by means of inwardly projecting keys 8 at its upper and lower ends and inwardly projecting keys 9 at a point intermediate its ends. The sleeve being maintained spaced from the mandrel 4 by the keys 8 and 9, a fluid passage 10 is formed within the sleeve 7 through which oil or like liquid or fluid flows to the top of the swab during the lowering of the same into the well in the casing 1. A tapered shoulder 11 is formed at the lower end of the tool-joint section 5 of the mandrel 4 and acts as an upward stop for the sleeve 7. A nut 12 is screw-threaded

to the lower end of the mandrel 4 and is provided with an annular recess 13, into which annular recess 13 a packing ring 14, constructed of any desired or like material, is mounted, and which packing ring 14 may be tapered at its upper face 15 to provide a tapered seat on which the lowered tapered end face 16 of the sleeve 7 is engaged during the raising of the swab 2 in the casing 1. The packing ring 14 may be constructed of steel or like material but it is preferable that some such resilient packing material, such as rubber, be employed so as to eliminate the necessity of forming a perfect ground fit between the tapered faces 15 and 16.

The sleeve 7 preferably comprises upper and lower circular nuts 17 and 18 and an intermediate circular nut 19 which are connected by tubular sleeves 20, the tubular sleeves 20 being screw-threaded at their opposite ends to the circular nuts 17 or 18 and the intermediate circular nut 19 as illustrated in Figure 2.

Mounted on the tubular sleeves 20 are packing cylinders 21 which are concaved outwardly on their inner periphery as illustrated at 22 to provide fluid receiving recesses 23. The packing cylinders 21 may be of any desired or preferred construction of material but are preferably composed of a resilient material, such as rubber, and are tapered at their ends as illustrated at 24 to fit the tapered end faces 25 and 26 of the end circular nuts 17 and 18 and the intermediate circular nut 19. The concave packing cylinders 21 may be adjusted as to the amount of bulging thereof from the sleeves 20 or as to their diameter by screw-threading the end circular nuts 17 or 18 on the sleeves 20 so that the outside diameter of the packing cylinders 21 may be accurately regulated or adjusted before the swab is lowered into the well casing 1.

In order to maintain the packing cylinders 21 against the wall of the casing 1 while the swab is being raised from the well, ports 27 are formed in the tubular sleeves 20 in communication with the fluid receiving recesses 23 and also in communication with the passage 10 formed within the tubular sleeve 7 so that during the lowering of the swab into the well when the oil or fluid is permitted to flow through the passage 10, the fluid receiving recesses 23 formed by concaving the packing cylinders 21 will be filled with the oil or fluid so that when the swab 2 is raised in the casing 1 to raise the said liquid to the surface of the well, the liquid will exert a pressure upon the interior of the packing members 21 to force the same outward against the wall of the casing 1. The recesses 23 extend a substantial length of the packing cylinders 21 so that this fluid pressure will be exerted evenly throughout a considerable extent of the periphery of the packing cylinders 21.

In many localities, particularly in those fields, commonly known as the mid-continent fields, cables or lines are employed in swabbing a well so that it is extremely desirable, if not necessary, that means be provided in such a swab 2 for limiting the load of oil which may be carried by such a swab to the surface of the well. In order to accommodate such requirements, I provide a bore 28 formed substantially axially in the lower end of the mandrel 4 and which terminates in a transverse port 29 which communicates with the passage 10. The bore 28 may either be plugged, as illustrated by the plug 30, screw-threaded into the collar 31, which is screw-threaded into the lower end of the mandrel 4, or an unloader 32 may be screw-threaded into the collar 31, which unloader comprises a connecting member 33 which is screw-threaded into position occupied by the plug 30 in the illustration of this invention shown in Figure 2, and which connecting member 33 is screw-threaded at its opposite end to a valve cage 34 in which a removable valve seat 35 is positioned and against which seat 35 a ball valve member 36 is yieldably urged by means of a compression spring 37. In order to regulate the compressive force of the spring 37 against the bore 36 so as to regulate the load or column of oil which may be carried from the well by such a swab 2, or in order to regulate the tension which will be imparted to such a cable 3, an adjusting guide-nut 38 is screw-threaded into the lower end of the valve cage 34 and is adapted to engage the lower end of the compression spring 37. The adjusting guide-nut 38 has a guide portion 39 formed at its upper end and adapted to extend into the compression spring 37. By adjusting the guide nut 38 on its threads, the compressive force exercised by the compression spring 37 against the ball valve member 36 may be regulated.

Having fully described a preferred embodiment of this invention, it is to be understood that I do not wish to be limited to the exact details herein set forth which may obviously be varied without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. In a swab, the combination of a mandrel, and a tubular sleeve longitudinally slidably mounted on the said mandrel and spaced therefrom to provide a fluid passage said sleeve comprising upper, lower and intermediate nuts, and sleeves adjustably connecting the said nuts, and packing cylinders mounted on the said sleeves between the said nuts.

2. In a swab, the combination of a mandrel and a tubular sleeve longitudinally slidably mounted on the said mandrel, said sleeve comprising an upper nut having a tapered lower end face, a sleeve adjustably screw-

threaded to the said nut, an intermediate nut to which the said sleeve is secured, a packing cylinder mounted on the said sleeve between the said nuts and adapted to be expanded outwardly by the said upper nut, a lower nut, a second sleeve screw-threaded to the lower nut and the intermediate nut, and a packing cylinder mounted between the said intermediate nut and lower nut and adapted to be expanded outwardly by the said lower nut.

3. In a swab, the combination of a mandrel substantially solid, a sleeve slidably mounted on the said mandrel, means for holding the said sleeve spaced from the said mandrel to provide a fluid passage, longitudinally through the said sleeve, a valve seat supported at the end of the said mandrel and adapted to engage the lower end face of the said sleeve to close the said fluid passage when the swab is raised, packing means mounted on the said sleeve and expandable outwardly, a bore formed in the said mandrel at its lower end and communicating through a port with the said passage, and an unloader secured to the said mandrel in communication with the said bore.

4. In a swab the combination of a substantially solid mandrel sleeve, means slidably mounted on the said mandrel, the said sleeve means comprising opposite and intermediate nuts tubular sleeves screw-threaded to the said nuts at their opposite ends packing cylinders having outwardly concaved inner peripheries mounted on the said sleeves and engaged at their opposite ends by the said nuts, inwardly projecting keys formed on the inner periphery of the said nuts for holding the said sleeve means spaced from the said mandrel, the said tubular sleeve having a plurality of ports formed therein for establishing communication from the interior of the said sleeve means and the outwardly concaved peripheral recesses formed in the said packing cylinders, and interlocking tapered sections formed at the engaging ends of the said packing cylinders and said nuts.

5. In a swab, the combination of a mandrel, a packing sleeve slidably mounted on the mandrel and spaced therefrom to provide a fluid passage, valve means mounted on the mandrel below the sleeve to close said passage when the mandrel is moved upwardly in said sleeve, the mandrel having a by-pass port formed in its lower end to by-pass the valve means, said by-pass port establishing communication from below the swab to said fluid passage, and an unloader secured to said mandrel for automatically closing said by-pass port.

6. The combination with a swab of the class described including a mandrel, a packing sleeve, valve means, and a port by-passing said valve means, of an unloader including a nipple secured to the lower end of the mandrel in communication with the by-pass port, a valve body, the nipple being secured to the body so as to maintan a removable valve seat therein, a valve member seated on said seat, means for yieldably urging said valve member toward said seat and means for adjusting said yieldable holding means.

Signed at Torrance, Calif., this 11th day of Feb., 1926.

FORREST J. YOUNG.